

LISTING OF THE CLAIMS

The following is a listing of claims pending in the application.

1. **(Original)** An integrated circuit for use in a transceiver module, the integrated circuit comprising:
 - a first electrical input port for receiving a first serial electrical data stream;
 - receiver eye opener circuitry for retiming and reshaping the first serial electrical data stream;
 - a first electrical output port for transmitting the retimed and reshaped first serial electrical data stream to external to the integrated circuit;
 - receiver bypass circuitry for switchably selecting a bypass data path from the first electrical input port to the first electrical output port but bypassing retiming and reshaping of the first serial electrical data stream;
 - a second electrical input port for receiving a second serial electrical data stream from external to the integrated circuit;
 - transmitter eye opener circuitry for retiming and reshaping the second serial electrical data stream; and
 - a second electrical output port for transmitting the retimed and reshaped second serial electrical data stream.
2. **(Original)** The integrated circuit of claim 1 wherein the bypass data path is selected when the first serial electrical data stream has a data rate below a predetermined threshold.
3. **(Original)** The integrated circuit of claim 2 wherein:
 - the receiver eye opener circuitry has a data rate range including 10 Gb/s; and
 - the bypass data path is selected when the first serial electrical data stream has a data rate below approximately 3 Gb/s.
4. **(Original)** The integrated circuit of claim 1 wherein the bypass data path is selected when the first serial electrical data stream has a data rate that is not within a data rate range of the receiver eye opener circuitry.

5. **(Original)** The integrated circuit of claim 1 wherein the bypass data path is selected in response to a loss of lock (LOL) signal.

6. **(Original)** The integrated circuit of claim 1 wherein the bypass data path is selected in response to a loss of signal (LOS) signal.

7. **(Original)** The integrated circuit of claim 1 wherein the bypass data path is selected in response to a command received from external to the integrated circuit.

8. **(Original)** The integrated circuit of claim 1 further comprising:
 bypass control circuitry coupled to the receiver bypass circuitry for controlling the receiver bypass circuitry to select and deselect the bypass data path

9. **(Original)** The integrated circuit of claim 1 wherein the receiver bypass circuitry comprises an adaptive equalizer.

10. **(Original)** The integrated circuit of claim 1 further comprising:
 power management circuitry for powering down the receiver bypass circuitry when the bypass data path is not selected.

11. **(Original)** In an integrated circuit for use in a transceiver module, a method of communicating data comprising, within the integrated circuit:

receiving a first serial electrical data stream;

switchably selecting or not selecting a bypass data path;

retiming and reshaping the first serial electrical data stream when the bypass data path is not selected;

passing through the first serial electrical data stream when the bypass data path is selected;

transmitting the retimed and reshaped first serial electrical data stream to external to the integrated circuit when the bypass data path is not selected, or transmitting the passed-through first serial electrical data stream to external to the integrated circuit when the bypass data path is selected;

receiving a second serial electrical data stream from external to the integrated circuit;

retiming and reshaping the second serial electrical data stream; and

transmitting the retimed and reshaped second serial electrical data stream.

12. **(Original)** The method of claim 11 wherein the step of switchably selecting or not selecting a bypass data path comprises selecting the bypass data path when the first serial electrical data stream has a data rate below a predetermined threshold.

13. **(Original)** The method of claim 11 wherein the step of switchably selecting or not selecting a bypass data path comprises selecting the bypass data path when the first serial electrical data stream has a data rate that is not within a data rate range of the step of retiming and reshaping.

14. **(Original)** The method of claim 11 wherein the step of switchably selecting or not selecting a bypass data path comprises selecting the bypass data path in response to a loss of lock (LOL) signal.

15. **(Original)** The method of claim 11 wherein the step of switchably selecting or not selecting a bypass data path comprises selecting the bypass data path in response to a loss of signal (LOS) signal.

16. **(Original)** An integrated circuit for use in a transceiver module, the integrated circuit comprising:

first eye opener means for retiming and reshaping a received first serial electrical data stream;

output means for transmitting the retimed and reshaped first serial electrical data stream to external to the integrated circuit;

bypass means for switchably selecting a bypass data path to the output means but bypassing retiming and reshaping of the first serial electrical data stream;

input means for receiving a second serial electrical data stream from external to the integrated circuit;

second eye opener means for retiming and reshaping the second serial electrical data stream.

17. **(Original)** An integrated circuit for use in a transceiver module, the integrated circuit comprising:

an electrical input port for receiving a serial electrical data stream;

an electrical output port for transmitting a retimed and reshaped serial electrical data stream to external to the integrated circuit;

receiver eye opener circuitry for retiming and reshaping the serial electrical data stream, the receiver eye opener circuitry including at least two data paths for the serial electrical data stream, each data path having a different data rate range; and

selection circuitry for switchably selecting the data path that has a data rate range compatible with a data rate of the serial electrical data stream.

18. **(Original)** The integrated circuit of claim 17 wherein each data path comprises:

clock and data recovery (CDR) circuitry, wherein the data rate range of each data path is determined by the data rate range of the CDR circuitry.

19. **(Original)** The integrated circuit of claim 17 further comprising:

rate detection circuitry for determining the data rate of the serial electrical data stream.

20. **(Original)** The integrated circuit of claim 17 further comprising:
receiver bypass circuitry for switchably selecting a bypass data path from the electrical input port to the electrical output port but bypassing retiming and reshaping of the serial electrical data stream.
21. **(Original)** The integrated circuit of claim 17 further comprising:
power management circuitry for powering down the data paths that are not selected.
22. **(Original)** In an integrated circuit for use in a transceiver module, a method of communicating data comprising, within the integrated circuit:
receiving a serial electrical data stream;
switchably selecting a data path that has a data rate range compatible with a data rate of the serial electrical data stream;
retiming and reshaping the serial electrical data stream within the selected data path; and
transmitting the retimed and reshaped serial electrical data stream to external to the integrated circuit.
23. **(Original)** An integrated circuit for use in a transceiver module, the integrated circuit comprising:
input means for receiving a serial electrical data stream;
output means for transmitting a retimed and reshaped serial electrical data stream to external to the integrated circuit;
eye opener means for retiming and reshaping the serial electrical data stream, the eye opener means including at least two data paths for the serial electrical data stream, each data path having a different data rate range; and
selection means for switchably selecting the data path that has a data rate range compatible with a data rate of the serial electrical data stream.

24. **(Previously Presented)** A transceiver module, comprising:

a ROSA;

a TOSA;

receive path eye opener circuitry including a first input and output and configured so that a first data stream received from the ROSA has a lower jitter at the first output than at the first input;

receive path bypass circuitry configured so that when the first data stream has a data rate less than about 10Gb/s, the first data stream bypasses the receive path eye opener circuitry along a first bypass path;

transmit path eye opener circuitry including a second input and output and configured so that a second data stream has a lower jitter at the second output than at the second input; and

transmit path bypass circuitry configured so that when the second data stream has a data rate less than about 10Gb/s, the second data stream bypasses the transmit path eye opener circuitry along a second bypass path, the second bypass path being in communication with the TOSA.

25. **(Previously Presented)** The transceiver module as recited in claim 24, wherein the transceiver module is substantially compliant with the XFP MSA.

26. **(Previously Presented)** The transceiver module as recited in claim 24, wherein bypass of the receive path eye opener circuitry and transmit path eye opener circuitry occurs at a data rate of about 8.5Gb/s.

27. **(Previously Presented)** The transceiver module as recited in claim 24, wherein at least one of the receive path bypass circuitry and the transmit path bypass circuitry comprises:

a CDR; and

a retimer.

28. **(Previously Presented)** The transceiver module as recited in claim 24, wherein at least one of the receive path bypass circuitry and the transmit path bypass circuitry comprises one of: a passive equalization circuit; and, an active equalization circuit.

29. **(Previously Presented)** The transceiver module as recited in claim 24, wherein the transmit path eye opener circuitry and the receive path eye opener circuitry are data rate responsive.

30. **(Previously Presented)** The transceiver module as recited in claim 24, wherein bypass of the receive path eye opener circuitry and transmit path eye opener circuitry can be implemented in at least one of the following ways: manually; and, automatically.

31. **(Previously Presented)** The transceiver module as recited in claim 24, wherein bypass of the receive path eye opener circuitry and transmit path eye opener circuitry occurs for a range of data rates less than about 10Gb/s.

32. **(Previously Presented)** The transceiver module as recited in claim 24, wherein:
the receive path eye opener circuitry and receive path bypass circuitry collectively comprise a receiver eye opener IC; and
the transmit path eye opener circuitry and transmit path bypass circuitry collectively comprise a transmitter eye opener IC.

33. **(Previously Presented)** The transceiver module as recited in claim 32, wherein the receiver eye opener IC and transmitter eye opener IC each comprise circuitry for a plurality of eye openers, each of the plurality of eye openers being configured to operate in connection with a predetermined data rate or predetermined range of data rates.

34. **(Previously Presented)** The transceiver module as recited in claim 24, wherein the transceiver module is compatible with the Fibre Channel protocol.

35. **(Previously Presented)** A transceiver module, comprising:

a ROSA;

a TOSA;

receive path eye opener circuitry including a first input and output and configured so that a first serial data stream received from the ROSA has a lower jitter at the first output than at the first input;

receive path bypass circuitry configured so that when the first serial data stream has a data rate of about 8.5Gb/s, the first serial data stream bypasses the receive path eye opener circuitry along a first bypass path;

transmit path eye opener circuitry including a second input and output and configured so that a second serial data stream has a lower jitter at the second output than at the second input; and

transmit path bypass circuitry configured so that when the second serial data stream has a data rate of about 8.5Gb/s, the second serial data stream bypasses the transmit path eye opener circuitry along a second bypass path, the second bypass path being in communication with the TOSA, and the transceiver module being substantially compliant with the XFP MSA.

36. **(Previously Presented)** The transceiver module as recited in claim 35, wherein the transceiver module is compatible with the Fibre Channel protocol.

37. **(Previously Presented)** The transceiver module as recited in claim 35, wherein bypass of the receive path eye opener circuitry and transmit path eye opener circuitry can be implemented in at least one of the following ways: manually; and, automatically.

38. **(Previously Presented)** The transceiver module as recited in claim 35, wherein bypass of the receive path eye opener circuitry and transmit path eye opener circuitry occurs for at least one other data rate in addition to the about 8.5Gb/s data rate.

39. **(Previously Presented)** A transceiver module, comprising:
- a ROSA and a TOSA; and
 - a first IC configured to communicate with the ROSA, and a second IC configured to communicate with the TOSA, each IC configured to bypass clock and data recovery and retiming for a data rate of about 8.5Gb/s, and comprising:
 - a first buffer including a reference clock input and output;
 - a second buffer including data signal input and output, and an LOS output;
 - a CDR including:
 - a data signal input and output, the CDR data signal input connected to the second buffer data signal output;
 - reference clock input and output, the CDR reference clock input being connected to the first buffer reference clock output; and
 - an LOL output;
 - an RT including:
 - a reference clock input connected to the CDR reference clock output;
 - a data signal input connected to the CDR data signal output; and
 - a data signal output;
 - a multiplexer including:
 - a first input connected to the data signal output of the second buffer;
 - a second input connected to the RT data signal output;
 - a third input; and
 - an output;
 - a third buffer including:
 - an input connected to the multiplexer output; and
 - an output; and
 - a control logic module including:
 - a first input connected to the LOS output;
 - a second input connected to the LOL output;
 - a third input connectible to an external device;
 - a first output connectible to an external device; and
 - a second output connected to the third input of the multiplexer.

40. **(Previously Presented)** The transceiver module as recited in claim 39, wherein:
the control logic module is responsive to:
an LOS signal from the second buffer;
an LOL signal from the CDR; and
a command from a host; and
the control logic module is configured to transmit a control signal to the multiplexer.
41. **(Previously Presented)** The transceiver module as recited in claim 39, wherein the transceiver module is substantially compliant with the XFP MSA.
42. **(Previously Presented)** The transceiver module as recited in claim 39, wherein bypass of the receive path eye opener circuitry and transmit path eye opener circuitry occurs for at least one other data rate in addition to the about 8.5Gb/s data rate.
43. **(Previously Presented)** The transceiver module as recited in claim 39, wherein the transceiver module is compatible with the Fibre Channel protocol.